

### **REMARKS**

This Amendment is responsive to the Office Action mailed August 17, 2007. After entry of this Amendment, claims 1-9 are currently pending in this application and subject to examination. The Abstract is amended to consist of a single paragraph. Claim 1 is amended to clarify the process and claims 1 and 6 are amended to delete the “in particular” language. Support for these amendments is found at page 3, lines 6-11 and page 4, lines 21-25 of the present specification. New claims 8 and 9 are added. Support for new claims is found in claims 1 and 6 as originally filed. No new matter is added.

Reconsideration of the application as amended is respectfully requested in view of the following remarks.

#### **Defective Declaration**

The Examiner asserts that the Declaration filed April 25, 2005 is defective because it contains non-initialed and non-dated alterations. Applicants file concurrently herewith a Supplemental Declaration that complies with 37 C.F.R. § 1.67(a), as required by the Examiner.

#### **Specification**

The Examiner objects to the Abstract as not being limited to a single paragraph. Applicants have amended the Abstract to consist of a single paragraph, as required by the Examiner. A “clean version” of the Abstract, as amended above, is filed concurrently herewith on a single sheet titled “**ABSTRACT**”. Applicants believe this amendment obviates the Examiner’s objection and respectfully requests its withdrawal.

#### **Rejection Under 35 U.S.C. § 112, First Paragraph**

Claim 1 stands rejected under 35 U.S.C. § 112, first paragraph, as not enabled. Specifically, the Examiner asserts that while claim 1 recites a three-step process for removing NO<sub>x</sub> and N<sub>2</sub>O out of a gas, page 4, lines 21-25 of the present specification appears to suggest that Applicants have only enabled a two-step process. Applicants respectfully traverse.

In his rejection, the Examiner characterizes the process of claim 1 as a “three-step process for removing NO<sub>x</sub> and N<sub>2</sub>O out of a gas, comprising:

- a) a first step of *removing* NO<sub>x</sub> out of the gas;
- b) a second step of *removing* N<sub>2</sub>O out of the gas; and
- c) a third step of *passing* the gas through the reactor containing an iron-laden zeolite at a temperature of up to 450 °C.” See page 3 of August 17, 2007 Office Action.

In contrast, claim 1, as amended, recites:

“A process for reducing the content of NO<sub>x</sub> and N<sub>2</sub>O in gases, comprising:

- a) *adding* at least one nitrogen-containing reducing agent to the NO<sub>x</sub>- and N<sub>2</sub>O-containing gas in at least the amount required for complete reduction of the NO<sub>x</sub>,
- b) *adding* a hydrocarbon, carbon monoxide, hydrogen or a mixture of one or more of these gases to the NO<sub>x</sub>- and N<sub>2</sub>O-containing gas of a) for the reduction of the N<sub>2</sub>O to form a gas mixture, and
- c) *introducing* the gas mixture of b) into at least one reaction zone at temperatures of up to 450 °C which contains one or more iron-laden zeolites.”

The process of claim 1, as amended, clearly comprises three features. Support for these features are found at page 2, line 22 to page 3, line 4 of the present specification, and are thus enabled. The Examiner misinterprets features a) and b) of claim 1 as requiring the sequential removal NO<sub>x</sub> and N<sub>2</sub>O out of the gas. However, it is clear from amended claim 1 above that feature a) recites *adding* at least one nitrogen-containing reducing agent to the NO<sub>x</sub>- and N<sub>2</sub>O-containing gas in at least the amount required for complete reduction of the NO<sub>x</sub>, while feature b) recites *adding* a hydrocarbon, carbon monoxide, hydrogen or a mixture of one or more of these gases to the NO<sub>x</sub>- and N<sub>2</sub>O-

containing gas of a) for the reduction of the  $\text{N}_2\text{O}$  to form a gas mixture. Neither feature recites **removing**  $\text{NO}_x$  or  $\text{N}_2\text{O}$  from the gas. Removal of  $\text{NO}_x$  and  $\text{N}_2\text{O}$  in the claimed process does not occur at least until the gas mixture of b) is introduced into at least one reaction zone which contains one or more iron-laden zeolites at temperatures of up to  $450^\circ\text{C}$ . The passage which the Examiner refers to as suggesting a two-step process (page 4, lines 21-25 of the present specification) simply describes a preferred embodiment where reduction of the  $\text{NO}_x$  and  $\text{N}_2\text{O}$  content in the presence of a single catalyst consisting essentially of one or more iron-laden zeolites. Since claim 1, as amended, is enabled, Applicants respectfully request withdrawal of the rejection.

#### **Rejection Under 35 U.S.C. § 112, Second Paragraph**

Claims 1 and 6 stand rejected under 35 U.S.C. § 112, second paragraph, as indefinite. Specifically, the Examiner asserts that the phrase “in particular” renders the claims vague and indefinite because preferences are properly set forth in the specification rather than the claims. Applicants have amended claims 1 and 6 to delete this phrase and added new claims 8 and 9 to claim the deleted features. Applicants believe this amendment obviates the Examiner’s rejection and respectfully requests its withdrawal.

#### **Rejection Under 35 U.S.C. § 103(a)**

Claims 1-7 stand rejected under 35 U.S.C. § 103(a) as obvious over WO 01/51182 to Schwefer et al. (hereinafter, “Schwefer”) in view of the literature reference titled “Selective catalytic reaction of  $\text{N}_2\text{O}$  with methane in the presence of excess oxygen over Fe-BEA zeolite” by Kameoka et al. (hereinafter, “Kameoka”). Specifically, the Examiner asserts that Schwefer teaches all of the process limitations of claim 1 except for the use of a hydrocarbon, carbon monoxide, hydrogen, or mixture thereof as a reducing agent for  $\text{N}_2\text{O}$ . The Examiner asserts that Schwefer teaches the use of NO as the reducing agent for  $\text{N}_2\text{O}$  instead. The Examiner contends that it would be obvious for persons of ordinary skill in the art to modify the Schwefer process by substituting methane for NO as the  $\text{N}_2\text{O}$  reducing agent, since Kameoka discloses the

reduction of  $\text{N}_2\text{O}$  with methane over an iron-exchanged BEA zeolite catalyst. *See* page 5, line 9 to page 6, line 15 of the August 16, 2007 Office Action. Applicants respectfully traverse.

Schwefer discloses a process of reducing  $\text{NO}_x$  and  $\text{N}_2\text{O}$  from the residual gas of nitric acid production. *See* Abstract of US 2003/0143142 A1, the published U.S. national stage of Schwefer. Schwefer teaches a two-stage process: in the first stage,  $\text{NO}_x$  in the exhaust gas is reduced with ammonia; in the second stage,  $\text{N}_2\text{O}$  is catalytically decomposed over an iron-loaded zeolite. *Id.* Schwefer teaches that catalytic decomposition of  $\text{N}_2\text{O}$  is achieved with the aid of a **sub-stoichiometric** amount of  $\text{NO}_x$ , which is left over from the first stage and which acts as a **co-catalyst** to the zeolite catalyst. *See* ¶¶ [0022] and [0029] of US 2003/0143142 A1.

Kameoka discloses reduction of  $\text{N}_2\text{O}$  with excess methane in the presence of an excess of oxygen over Fe ion-exchanged BEA zeolite. *See* page 745 of Kameoka. In the Kameoka process, the methane is consumed **stoichiometrically** with  $\text{N}_2\text{O}$ . *See, e.g.*, Table 1 of Kameoka.

Claim 1, as amended, is not obvious over the combined teachings of Schwefer and Kameoka, since NO and methane are not “known functional equivalents” as the term pertains to the process of Schwefer. Relying on *In re Fout* and MPEP § 2144.06, the Examiner asserts that claim 1 is *prima facie* obvious over the combined teachings of Schwefer and Kameoka because it would be obvious for persons of ordinary skill in the art to substitute the NO of Schwefer (“one known functional equivalent”) with the methane of Kameoka (“another known functional equivalent”). However, methane cannot be used as a “functional equivalent” of NO in the Schwefer process. As noted above, Schwefer teaches that  $\text{NO}_x$  (of which NO is a species along with  $\text{NO}_2$ ) acts as a co-catalyst to the zeolite and is thus not consumed in the reaction. In contrast, the methane in Kameoka is oxidized to form  $\text{CO}_2$  and  $\text{H}_2\text{O}$  and is thus consumed during the reduction of  $\text{N}_2\text{O}$ . As such, methane cannot be a “known functional equivalent” to  $\text{NO}_x$ , as it is used in the Schwefer process, since it would not behave as a catalyst. Furthermore, persons of ordinary skill in the art have no reasonable expectation that substituting the sub-stoichiometric amount of  $\text{NO}_x$  with a sub-stoichiometric amount of methane would be successful. As pointed out above, the methane in the Kameoka process is consumed stoichiometrically with  $\text{N}_2\text{O}$ . If the sub-stoichiometric amount of  $\text{NO}_x$  in Schwefer was replaced by a sub-stoichiometric amount of

methane, there would be insufficient methane present for reduction of the N<sub>2</sub>O. As such, there is no reasonable expectation that such a substitution would succeed, which is required to establish claim 1 as *prima facie* obvious.

Since (1) NO and methane are not “known functional equivalents” and (2) there is no reasonable expectation that substituting NO with methane would be successful, the Examiner has failed to establish claim 1 is *prima facie* obvious. Furthermore, since claims 2-9 all depend directly or indirectly from claim 1, the Examiner has also failed to establish that these claims are *prima facie* obvious. Therefore, Applicants respectfully request that the above rejection be withdrawn.

In view of the above amendment and remarks, Applicants believe the pending application is in condition for allowance.

The Director is hereby authorized to charge \$120.00 to Deposit Account No. 03-2775, under Order No. 09600-00022-US, to cover the fee under 37 C.F.R. § 1.17(a)(1) for a Petition for a One-Month Extension of Time Pursuant to 37 C.F.R. § 1.136. Should any other fees be required in connection with this Amendment, authorization is hereby made to charge any fees due or outstanding, including any extension fees, or credit any overpayment, to Deposit Account No. 03-2775.

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Respectfully submitted,

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